

Executive Summary

Title: The Future of Marine Infantry: Cyber-Warriors or General-Purpose, All-Weather Grunts?

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Thesis: Marine infantry innovation should focus on enhancing the basic performance of the riflemen vice pursuing advanced technologies in order to create an "army of star troopers."

Discussion: Both services that possess an infantry arm are pursuing "enhancements" aimed towards divergent objectives. Specifically, the U.S. Army is seeking an infantry arm of "human sensors" that will link into the "digitized" battlefield of the future and have the capability to contribute and share in the "perfect knowledge" of the future Army, Force XXI. Army leaders are encouraging technology developments with the erroneous expectation that future battlefields will be characterized by reduced friction or fog of war. On the other hand, the U.S. Marine Corps is pursuing a low-tech approach with hesitant involvement in the Army's high-tech efforts. This approach appears to be the better choice for the variety of possible missions that Marine infantry will be assigned in the future.

Conclusion: While high-tech soldiers may be attractive in many respects, they will be too expensive for the Marine Corps and will not possess the flexibility to operate in the grimy and disorderly world of the infantry environment of the near future. Further, these infantry units will have reduced applicability across the complete spectrum of war, from Operations Other Than War (OOTW) to conventional warfare. The Marine Corps should continue to create an environment for innovation but watch the creation of the high-tech soldier with a jaundiced eye.

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CHAPTER ONE: INTRODUCTION

"A "modem" infantry may ride sky vehicles into combat, fire and sense its weapons through instrumentation, employ devices of frightening lethality in the future--but it must also be old fashioned enough to be iron-hard, poised for instant obedience, and prepared to die in the mud."

T. R. Fehrenbach, This Kind of War

The U.S. military's response in the post-Cold War years, thus far, has been characterized by a struggle to maintain its indisputably superior capability. Meanwhile, the political leadership has attempted to produce a sizable "peace dividend" to confirm to the nation that the U.S. now abides in a stable world. As the fighting force diminishes in size and the formidable warfighting tools age and rust, the U.S. military institution must turn towards innovation to maintain (or improve) the capabilities they once possessed or... accept their waning power. For a military that represents the world's only superpower, the choice is obvious. Consequently, the fall of the Iron Curtain has fertilized the seeds of revolutionary, or at least evolutionary, change in the way the military will conduct war in the future. This impetus to change coincides with the explosion in information-related technologies throughout both civilian and military sectors.

Many authors, historians and scholars argue that the world is undergoing a transformation in the nature and conduct of war.¹ This fundamental reformation is commonly referred to as a Revolution in Military Affairs² (RMA) or Military Technical Revolution (MTR). One cannot precisely or consistently define RMAs, but the challenge to the military remains consistent -- how to seize the opportunities that the RMA presents.³ This RMA in which we find ourselves is a revolution in the impact of information processing throughout the battlespace. Dr. Michael Mazarr, a respected scholar in strategic military studies, recognizes the existence of this current RMA and confirms its focus by stating, "this is the revolution in information, sensing and precision strike technologies."⁴ Several of these authors, including Dr. Mazarr, Alvin and Heidi Toffler and others, believe this transformation is the dawning of a new age of warfare--the age of information warfare.⁵ No matter what label one chooses to give to the period in which we find ourselves, there is little opposition to the idea that the post-Cold War era is bringing about a transformation

in the conduct of war.

This RMA has produced major strides in many warfare disciplines, as the effective precision strike and sensor technologies exemplified in Southwest Asia during Operation Desert Storm. Information-related technologies yielded many technological innovations throughout the operations of our recent past and the number of applications will surely grow. These innovations have effectively altered many aspects of warfare, and the defense community is presently attempting to integrate these advances into new warfighting concepts.

Not all combat arms, however, are equally benefiting from the potential of innovation. Specifically, infantry-focused innovation has not kept pace with other more technologically-centric arms, such as aviation, armor and artillery. With the exception of a few relatively minor technological enhancements (new weapons, radio improvements, a lighter flak jacket, and a few others), no major innovations have occurred since World War II. Of course, many may challenge the importance of infantry innovation, as they believe that it is not the decisive arm on the battlefield. The history of warfare suggests that infantry may no longer be the decisive arm, but it is clearly a critical component of a combined arms warfare methodology and integral to the final resolution of conflicts. In addition, the commitment of U.S. infantry, unquestionably, makes a significant strategic statement when it arrives on foreign soil, whether its purpose is to perform humanitarian assistance or to participate in traditional combat missions.

Over the past few years, greater technological emphasis has been given to the infantry arm, most notably by the army's research and development labs. Unfortunately, it appears that these technological enhancements, which will essentially transform today's infantryman into a "human sensor platform" for the Army, are being pursued without assessing the potential impact of these changes. As these costly technologies are implemented, they will effectively be traded for manpower by reducing the size of today's infantry units. Many military leaders, both civilians and those in uniform, support the notion that technological improvements can offset manpower reductions--and in many cases they are correct.⁶ As with innovation in other arms, analysis must be conducted to evaluate the impact of technological innovation throughout the complete range of potential future infantry missions--emphasizing those that are most likely.

The applicability of technology to the variety of infantry missions is clearly in doubt. The first concern is whether or not these technologies can ever be durable enough to be effective in the grimy and disorderly infantry habitat. No matter how much technology is strapped to the back of an infantryman, his environment will still be unfriendly, abusive and destructive, whether in the saltwater of the littorals, sewers of a urban region or the tropical heat of a temperate jungle. Therefore, innovators need be wary to ensure that developed technologies truly enhance the performance of the infantry across the wide spectrum of operating environments.

Without delving too deeply into the roles and missions debate, the applicability of these technologies may not apply equally to both services that possess the infantryman--the U.S. Army and the U.S. Marine Corps. For instance, the Army has stated that it intends to "digitize the battlefield" from the infantryman to the highest level of command. The Army envisions that digitization technology will allow a task force commander to know the position of every vehicle in his unit, and through an information network, instantaneously know the exact location and status of all other friendly platforms on the battlefield. This capability will provide the entire force "perfect knowledge" in the belief it will significantly reduce battlefield friction. The technologies currently under development for the infantry will integrate directly into this network and potentially improve situational awareness for each individual soldier.

The Marine Corps is contributing to the development of these Army technologies; but for a variety of reasons, has not succumbed to the scintillation of technology. The first reason is its Congressionally mandated mission. The Marine Corps has a statutory mandate established by the National Security Act of 1947 which states that it:

"shall be organized, trained, and equipped to provide fleet marine forces of combined arms, together with supporting air components, for the service with the fleet in the seizure of defense of advanced naval bases and for the conduct of such land operations as may be essential to the prosecution of a naval campaign. In addition, the Marine Corps . . . shall perform such other duties as the President may direct."⁷

The key phrase "shall perform other duties as the President may direct" implies that the Marine Corps must

be a general purpose, expeditionary force that possesses the capability to respond to any mission throughout the spectrum of war. . . whenever the President calls. With this required flexible readiness, the Marine Corps must ensure it has forces that can effectively prosecute forcible-entry amphibious landings as well as peacekeeping and humanitarian missions. Infantry units provide a vital component to this general purpose force by providing relatively inexpensive and capable manpower that is inherently flexible and mobile.

The second cause for Marine reluctance is the fact that the Marine Corps has always been the pauper of the services. It advertises itself as the service that provides "the biggest bang for the buck," and consequently cannot afford to gamble limited resources on skeptical technologies. The Marine Corps must allow industry and other services to take the majority of risks associated with research and development, while spending its meager pocket book on maintaining its required high state of readiness and conducting "directed" missions.

While it may be pleasurable on the surface to succumb to the glamour of technology, the Marine Corps must recognize that technology is not an instant panacea that removes friction from the battlefield and allows a commander to get inside the decision loop of a Somali warlord, for example. Only perceptive, intelligent "humans" have a possibility of performing this type of challenge; technology will only provide marginal assistance. Without a doubt, the Marine Corps should take a step back and observe the current set of infantry-based innovations that the Army is developing with a jaundiced eye. Additionally, the Marine Corps should continue to embrace the flexibility of its tried and tested people-centric structure, which will surely continue to solve the variety of "directed" problems in the near future, adapting innovation as required. As the Marine Corps develops new concepts, structures will surely change but the Marine Corps can not divorce itself from the human elements of soldiering.

Chapter Two

INNOVATION IN TODAY'S ENVIRONMENT

"...we are now in the early stages of a period in which advances in precision weaponry sensing and surveillance, computational and information-processing capabilities, and related systems will

trigger substantial changes in future wars, changes at least as profound and far reaching as the combined-systems "revolutions" of the interwar period."

Dr. Williamson Murray and Barry Watts

With the ending of the Cold War in 1989, the world began the inevitable process of deactivating its militaries to a "pre-war" status. The implications have resulted in many countries increasing their focus on internal, domestic issues and neglecting the many global concerns that threaten the world. This introspection and isolationism has led to significant reductions in defense budgets. The United States has not been any different. As an example, the U.S. Army has plummeted from the 1991 peak budget of \$90 billion and a force level of 710,000 to today's budget of \$62 billion and force level of 495,000.⁸ At these reduced levels, many U.S. government and military officials are concerned about the capability of the armed forces to provide the requisite deterrence, and in the case of aggression, acceptable containment. Reeling from the impact of these minimal coffers, the military is learning from its similar past experiences and seeking to fill the capability gap with new concepts and improved technology. Consequently, the innovators throughout the Services are seeking to capitalize on the RMA.

The challenge to the military lies in developing imaginative solutions that go beyond the comfortable and traditional answers of the past. Resting on the laurels of recent victories and acceptance of the status quo does not represent an acceptable response. In the wake of the long Cold war and relatively short Gulf War, the U.S. must fully assess the strategic environment and massage the national security strategy accordingly. In order for the U.S. military to remain viable in this future strategic environment, under the fiscal constraints mandated by politicians, the nation's military must turn to innovation. Many unpredictable forces contribute to military innovation in the aftermath of successful (or unsuccessful) resolutions of wars; the results of innovation are predicated on the response of the military to these pressures. According to the studies of Stephen Rosen, a framework for peacetime innovation "occurs when respected senior officers formulate a strategy for innovation, which has both intellectual and organizational components."⁹ The U.S. military senior leadership is currently espousing new concepts, such as Operational

Maneuver from the Sea (OMFTS) and Force XXI. When these new concepts are combined with the Marine Corps' establishment of the Commandant's Warfighting Lab and the heavy emphasis placed on the Army's technology-focused battle labs, one realizes that the military institution has established a basic framework for innovation. This openness to innovation can only lead to the type of past innovation success of which our history is full--carrier-based aviation, amphibious warfare and strategic bombing to name a few from the interwar period, 1919-1939.

As previously mentioned, the coincidence of this innovation thrust with the current RMA is producing new ways of integrating information on the battlefield. Capitalizing on this situation is envisioned to lead to an exponential improvement in situational awareness and strike precision. Many espouse that this improvement will result in a near elimination of the "fog of war."¹⁰ The counter to this extreme view is the hypothesis that new "fog" will replace old "fog" in the form of both low and high technology methods, limited only by imagination.

Following the removal of the Berlin Wall, the collapse of the Soviet Union and the dissolution of the Warsaw Pact, the threats across the world environment have drastically been altered. James Woolsey, former Director of Central Intelligence, articulates well the predicament of the resulting situation:

"Yes, we have slain a large dragon [USSR]. But we now live in a jungle filled with a bewildering variety of poisonous snakes [potentially explosive countries]. And in many ways, the dragon was easier to keep track of."¹¹

Civilization is in turmoil, as a result of many factors such as overpopulation, scarce natural resources and artificially drawn borders between nation-states. These powerful factors along with human-induced factors have caused great consternation within the groups that are effected. In many cases, this has wrought increased strife and physical clashes that are not bound by the currently defined nation-state boundaries.¹² Ethnic and religious strife are the buzzwords of the age, and as Martin Van Creveld argues in his book, *Transformation of War*, men enjoy a fight and are willing to fight over "minor" issues.¹³ Robert Kaplan's comments support this notion:

"As anybody who has had experience with Chetniks in Serbia, "technicals" in Somalia, Tontons Macoutes in Haiti, or soldiers in Sierra Leone can tell you, in places where the Western Enlightenment has not penetrated and where there has always been mass poverty, people find *liberation in violence.*"¹⁴

The response from "modern" countries has exacerbated this situation. Participating or observing the debacles in Somalia, Rwanda and other operations has generated isolationist attitudes and caused many countries to avoid extensive global involvement. As the undisputed world superpower, the U.S. will continue to involve itself in global concerns across the spectrum of potential conflict. In spite of many political difficulties, the military will be the quick answer political leaders will rely upon, whether the assignment is a humanitarian mission in Northern Iraq or "saber rattling" in the Taiwan straits. To answer these responsibilities, the U.S. military must be both innovative and adaptable in order to be prepared to answer all future challenges.

As a result, the Services and specifically the Marine Corps cannot afford to be prepared for only asymmetrical or symmetrical, conventional warfare between nation-states of the "third wave." Since the Marine Corps typically provides early entry forces into many operation, both of a forcible or non-forcible nature, it must possess flexibility to operate across the spectrum of warfare, from conventional war to Operations Other than War (OOTW). With this "requirement" in mind, the Marine Corps must ensure it maintains this capability, as it innovates and alters its current force structures.

Comparison to Interwar Period (1919-1938)

Today's interwar period is certainly not unique; any peacetime era is an interwar period in which innovation is a critical component to success for any military. Political forces are typically eager to reduce "inflated" military manpower in existence after the conclusion of a major war, regardless as to the outcome of the military conflict. The political objective of producing a "peace dividend" historically overrides the military's goal of maintaining its end-of-the-war capability. The period between World War I and World War II is a prime example of a similar period in history that contained many parallel occurrences. Through the study of the lessons of this period, current military

leadership will be better prepared to facilitate conceptual change for future warfighting.

It is difficult to quantify a pattern for the interacting forces that lead to successful innovations in an interwar period. A changing international security environment, however, appears to be a reoccurring theme and a strong catalyst for change.¹⁵ The conclusion of World War I drastically modified the international security environment and led to a perceived requirement for conceptual innovation of future military operations. The post-World War I militaries believed that future war was inevitable, but none could portend to know who the enemy would be. Thus, not surprisingly, the changing security environment along with other contributing factors provided a basis for innovation. Within this context, no bounds were placed on intellectual innovation and, an open and consummate environment to think about future war was created for many countries... without any inkling that the most devastating war in world history would take place in only 20 years.

Successful post-WWI innovations were numerous -- Germany's Blitzkrieg style of warfare, Japanese and American carrier-based aviation, and the U.S. Marine Corps amphibious warfare against defended beaches, to name a few.¹⁶ The Marine Corps example favorably lends itself to a comparison with today's situation, since the concept revolutionized its organizational structure and introduced successful new technology. In fact, the respected military historian, J.F.C. Fuller, concluded that the Marine Corps WWII operations in the Pacific were "in all probability... the most far reaching tactical innovation of the war."¹⁷ The experiences of the Marine Corps during this period provides many lessons that are clearly applicable for today's environment.

The Marine Corps of the interwar period struggled to maintain its viability as a major contributor to national security. Following the conclusion of the Great War, the Marine Corps' force structure was reduced as part of the natural post-war events; but soon the economic stress of the Great Depression promoted even deeper cuts. In an effort to reduce federal spending, President Hoover forced the Army and the Navy to review their most cherished programs and recommend eliminations. This increased interservice rivalry, as attempts were made to justify missions that would maintain corresponding resources and end strengths.¹⁸ These pressures combined with isolationist political pressures, forced the Marine Corps to

"bring home" Marines serving abroad in colonial occupation duties, such as in China and Nicaragua.

These experiences are uncannily parallel to today's experiences. As the Cold War books closed, the political leadership quickly sought to reduce the federal outlay for defense and begin investigating perceived redundancies within the services. For example, the Congressionally-mandated Commission on Role and Missions (CORM) was established to assess such "sacred cows" as each service's air forces and other perceived redundancies. The CORM did not produce any revolutionary findings nor produce any drastic recommendations, but nevertheless, the services were forced to justify their Cold War structures. In addition, immediately after the collapse of the Soviet Union and the Warsaw pact, the Defense Department also conducted an internal assessment of its Cold War structures. This assessment produced a new paradigm to justify a sizable force structure--the "two nearly simultaneously major regional contingencies strategy." As the political leadership eliminated structure from the military, continental and overseas bases were closed, units dissolved and the military evolved into a "force projection" military in which the majority of forces would have to be transported into a theater for any overseas operation. This process is strikingly similar to the isolationist response of the U.S. in 1920.

As the Marine Corps' colonial troops returned, the nearly omnipresent struggle for relevance as an individual service continued. Through the foresight of General George Barnett, Commandant from 1914-1920, the Marine Corps tightly aligned itself with the Navy once again. This critical action sewed the seeds for the mission that would sustain the Marine Corps throughout the rest of the twentieth century--the amphibious assault against defended shorelines.

The acquisition of the Philippines in the Spanish American war and the perception that this would inevitably lead to a clash of naval forces between the U.S. and Japan, motivated the Marine Corps leadership to opine how it might effectively wage a war with such distant lines of communications. To function over so great a distance, the Navy would require advanced naval bases to sustain the force and provide flexibility in order to maneuver towards the ultimate objective--mainland Japan. However, the Marine Corps

prior to World War I only addressed the simpler form of amphibious operations, the unopposed landing.

The Navy Department assessed that Japan would contest the U.S. in the future and drafted a plan to combat this threat, War Plan ORANGE. The Marine Corps' participation in this plan was yet to be accepted by the leadership but when General John Lejeune replaced Barnett in 1920, the Corps began to move in that direction. Anticipating that amphibious assaults would be the Marine Corps' future "bread and butter" operation, Lejeune began reorganizing to ensure the Marine Corps could meet this mission. Lejeune was committed to ensuring that the Marines could perform the appropriate missions with the fleet since he felt this was "the real justification for continued existence of the Marine Corps."¹⁹ He established a foundation for the development of the amphibious assault concept and his successors, most notably the future Commandant, General John Russell, continued the progression.

The similarity to the current environment lies in the openness of several senior officers to new ideas and concepts. Ideas such as Operational Maneuver From the Sea (OMETS) and "Sea Dragon" may be the amphibious assaults of the twenty-first century. By welcoming innovation, the current leadership stands to enhance the current relevance of the Marine Corps and better prepare its forces for future conflict. The Marine Corps can not afford to overlook this step.

Through the ingenuity of a few officers, organizational and technological solutions were adapted (or created) to fill voids in the amphibious assault concept. Certainly, this process was not without severe growing pains. Many senior leaders rejected the idea that the Marine Corps should focus on conducting operations against well defended enemy beaches, especially being aware of the British debacle at Gallipoli. But the interwar period provided ample time for the Marine Corps to overcome its doubters and develop this revolutionary capability.

History records success for the Marine Corps of World War II, but time may not be on the side of the current Marine Corps, as it prepares for future conflicts, whether conventional and unconventional. With this in mind, Marine Corps leadership can not delay in investigating new concepts including component technologies and force structures. These concepts must be investigated with a jaundiced eye. The Marine Corps must remain a capable, general purpose force-in-readiness.

The renowned Marine innovator, Major Earl Ellis, a confidant of General Lejeune, observed that

islands required as advanced bases in support of War Plan ORANGE would most likely be well defended and the Marine Corps would need a capability to capture and defend them. Ellis developed this requirement into a concept with concrete tasks which laid the foundation for the Marine Corps' development of amphibious warfare doctrine and its successful execution in the war in the Pacific.²⁰

Major Ellis' intellectual ability was clearly a significant contributing factor to the successful evolution of amphibious doctrine, but an innovation-conducive cultural environment also existed. When the Marine Corps arose to the need to develop a concept for securing advanced naval bases in support of naval operation, it was led by the senior leader of the Marine Corps, General John Lejeune, Commandant of the Marine Corps during the 1920s. General Lejeune ensured that Ellis' talents were applied to the problem by tasking him to study a war with Japan. After General Lejeune's tenure as

Commandant, another supporter of innovation became the Commandant, General John Russell. General Russell, became the champion for this effort, having realized, in 1933, that the Marine Corps' future success depended on the concepts articulated by Ellis. Consequently, he encouraged the creation of an environment that fostered innovation by implementing a three part strategy.

1.) The creation of the Fleet Marine Force (FMIF). This firmly established the Marine Corps as part of the U.S. Naval fleet and available to conduct appropriate operations as part of the Navy ashore or afloat, which opened the door for the study and practice of amphibious warfare.

2.) Gen. Russell tasked the Marine Corps Schools at Quantico, VA to suspend instruction and to use the faculty and students to produce a manual to train for the conduct of an amphibious assault. This step produced the Tentative Manual for Landing Operations in 1934 which formed the underlying doctrine for Marine Corps' operations in the central Pacific.

3.) Through the support of Gen. Russell, the Selection Bill of 1934 passed and effectively retired overage officers that were continuing to be promoted due to their seniority. This resulted in openings for younger officers that supported the developing innovations.²¹

These three steps paved the way for successful innovation during the interwar period by producing a conducive environment for change. Today's Marine Corps must encourage this same type of environment

in order to ensure its future success.

An Effective Innovation Framework

The key component of an effective framework appears to be fostering an environment for innovation. Without the senior leadership encouraging innovation throughout an organization, innovative concepts are usually ridiculed as "out of the box." Professional military organizations cannot allow this to occur. Military organizations must produce creative and imaginative officers willing to suggest alternative ways of doing business. Professional Military Education (PME) is paramount in this process by providing officers an opportunity to visualize and "think through" the process of conducting warfare. Another outcome to PME, as officers return to their operational duties, is the creation of a military culture that encourages thinking about the future and how an organization can improve. Military organizations must encourage this "think out of the box" mindset and protect those officers who do, in order to allow them to rise in rank and facilitate the implementation of new concepts.

Besides capitalizing on PME, organizations must reap the benefits of conducting field exercises and experiments. Talking about innovation is only the first step; the next step is implementing concepts in field exercises. As in the Marine Corps' experience with developing amphibious warfare doctrine, many of the required assets may not be available for testing new concepts. Nevertheless, executing these processes without the appropriate tools will provide valuable lessons. In addition, further analysis prior to "kick starting" the expensive and time-consuming acquisition process and developing the appropriate technological asset will save valuable resources. There is a caveat, however, to these exercises -- they must be relevant. Conducting exercises in the context of capable enemies, in probable environments, and with believable assumptions is a must. Additionally, the military can no longer afford to offer one another spurious praise for a "job well done" in an environment where budgets are dwindling. Honest after action evaluations are critical to improving and assessing new concepts. A final note is that time must be allowed for organizations to adequately evaluate and assess outcomes of these exercises. Operational tempo should encourage these necessary processes.

The final component of this framework is that innovation must be more than just the inclusion of new and improved equipment and technical alterations. It must encompass new concepts. Conceptual innovation affects all aspects of waging war from doctrine, tactics, strategy, training and education, and organizational structure. As concepts are developed, innovators and technicians should consider the impact these new concepts will have throughout an organization. Organizations cannot afford to develop technology for technology sake. They must understand the impacts that technological solutions have on the time and cost of training and educating individuals to be proficient with these solutions. Organizations must evaluate such tradeoffs to ensure the appropriate benefits are reaped. However, this constraint can not be allowed to stifle innovative ideas.

The innovation framework of:

1) fostering an innovative environment,

2) conducting exercises with relevant and meaningful evaluations and assessments of the results of

these exercises, and

3) looking beyond technical solutions by conceptualizing new ways of operation,

can potentially produce concepts as dramatic as the Marine Corps of the interwar period.

The present day Marine Corps is in the process of implementing such a framework

to encourage conceptual innovation with several steps. The willingness of the Marine Corps' senior

leadership to welcome innovation and "out of the box" thinking is a first step in fostering an innovative

environment. The establishment of a "think tank" organization, the Commandant's Warfighting Lab, and a

test unit, a Special Purpose Marine Air-Ground Task Force, are appropriate steps to conducting relevant

exercises and appropriate analysis of new concepts²². If this framework continues to expand by permeating

the PME structure of the Marine Corps and by promoting officers who are of an innovation "bent," the

Marine Corps will reap the type of revolutionary benefits that were exemplified in World War II.

The U.S. Marines success in WWII is clearly tied to their willingness to innovate during the

interwar period and to their boldness in applying these "new" concepts. Through extensive planning,

detailed coordination of all arms, flexibility of organization, individual initiative and significant firepower

at the small unit level the Marines were able to capture strongly defended, Japanese-held islands. By applying the lesson that led to the successful innovations in the interwar years, today's Marine Corps can engender a better environment for innovation.

Chapter Three

INFANTRY IN FUTURE MILITARY OPERATIONS

"There is, indeed, much irony in the realization that in the postwar [WWII] world, in the very shadow of weapons of mass destruction, the most effective means of altering the status quo has turned out to be a little man armed with nothing more than a rifle in his hand and an idea in his head."

Klaus Knorr, On the Use of Military Power in the Nuclear Age

Throughout the forty-five years of the Cold War, both sides developed nuclear forces that leaned on technological solutions. However, when wars broke out in diverse locations such as Vietnam, Sinai peninsula or Afghanistan, the infantry was an indispensable component. Vietnam provides a clear example of a war in which many of the other combat arms proved to have minimal effect in terminating the conflict. One only needs to consider the B-52 "carpet bombing" operations and the overall impact of air superiority on the outcome of the Vietnam War to confirm these notions. John English, author of *A Perspective on Infantry*, a classic work on the infantry combat arm, suggests that infantry has been instrumental in the conflicts since the end of World War II:

"In fact, any serious analysis of the approximately 30 major military engagements that have taken place since World War II²³ must take cognizance of the central fact that the infantry arm has played a dominant, often vital role in the outcome of each."²⁴

This is not to say that the other arms are not essential but that one should not neglect the important contribution and versatility of the infantry arm in this age of technology.

The range of likely future military operations is extremely varied; from full-scale nuclear or conventional war to peace operations that are as diverse as nation assistance, counterdrug and disaster relief.²⁵ The U.S. military can not afford to neglect any potential future operations that it may encounter. Ideally, force structures and capabilities will directly correlate to assigned missions. But this is not always so. A

superficial glance at recent operations illustrates the flexibility required of U.S. military power. This flexibility has been displayed in full regalia since the fall of the Iron Curtain through many diverse operations, from the Persian Gulf War to OOTW operations in Haiti, Somalia and Bosnia and others. Each of these experiences further illuminates the requirement for capable and versatile infantry forces.

The Persian Gulf War provides a contemporary example of conventional warfare in which the technology of the U.S. was clearly superior to the adversary's. However, the U.S. military still required a versatile infantry arm to perform additional functions beyond the basic role of "occupying of ground." For example, in the I Marine Expeditionary Force zone at the beginning of the ground phase of the war, the basic infantrymen proved essential by providing the flank protection for the armor breaching forces, as they penetrated the minefields. The desert environment reinforced the flexibility of the infantry by enhancing their mobility with mechanized vehicles.

An investigation into the realm of Operations Other Than War (OOTW) also delineates a lucid requirement for the basic foot soldier. As recent operations have shown, OOTW tasks are similar to the British colonial empire's "maintenance tasks" during the 19th and 20th century, extremely manpower intensive. In order to accomplish the tasks of feeding masses, controlling war and riot-prone peoples, assisting people stricken by natural disaster and other "non-warlike" tasks that the military will be called upon to do in the near term, soldiers must be available that are capable of performing a plethora of tasks and duties. These duties are additional responsibilities of all soldiers; but those less encumbered by technological equipment will have a primary role.

The infantry arm is an obvious place for innovators to turn, given its inherent flexibility to function in tasks as varied as fighting forest fires or "closing with and destroying the enemy through close combat." In today's environment of reduced resources and dwindling force structures, innovators should concentrate on the infantry arm due to its relative low cost. In response to differing ideas about the variety of potential tasks that the infantry may perform in future operations, current innovation efforts have an extremely wide focus. The diversity of these innovation efforts range from the unglamorous task of improving combat boots to mutating the infantryman into a sophisticated sensor platform.

Many current innovation efforts are of a purely technical nature in response to the widespread perception of a "perfect knowledge" future battlefield. Notwithstanding, many military leaders believe this perception to be a dream that disregards the fog and friction in both war and OOTW. The Army is banking on the realization of this perception and have embarked on a comprehensive program to redesign its forces towards achieving this high-tech "dream," entitled *Force Twenty-One* (Force XXI). In response to the Army's desire to change, many scientists, technologists and academians have shared their visions of a future Army. Additionally, the Army's R&D community has initiated numerous technology programs under the Force XXI banner. As a result of this service-wide technology focus and an Army Science Board study in 1991, the Army established a program for the individual soldier, *Twenty-First Century Land Warrior* (*21 CLW; pronounced "21 Claw"*), which considers the future soldier as the ultimate weapons system.²⁶ The 21 CLW program will be discussed in detail in chapter four.

The Army seeks to integrate this future "weapon system" into the "Digitized Battlefield" of the future. The digitized battlefield is an Army effort aimed at incorporating digital technology throughout the battlefield by 2010. The supporters believe that this will provide commanders and soldiers with an "unprecedented capability to gather and share tactical information," essentially achieving "perfect" battlespace awareness.²⁷

Unfortunately, if this effort is successful, the envisioned high-tech soldier of tomorrow will not possess the flexibility of today's infantryman, let alone possess the flexibility required for tomorrow's conflicts. The accouterments required to achieve integration into this digitized network may enable him to function better on a conventional-style battlefield but his effectiveness in any other environment may be reduced. By outfitting an infantry unit with the "necessary" equipment, unit size will be directly reduced due to the enormous expense. Moreover, the current pressures to "reduce manpower with technology" will incite further reductions. These shrinking units should be able to adequately perform future conventional infantry missions but with reduced manning they will not be able to accomplish the manpower-intensive tasks of

OOTW. Without a more comprehensive concept of infantry employment in the future, the basic

rifleman could prove to be useless in many operations of the twenty-first century.

Committing of Troops

For centuries, it has been an uncontested argument to state that "the occupying of territory is the ultimate decision factor in deciding the outcome of a battle." Many an aviator, however, will now argue the supremacy of airpower in "controlling" ground is the determining factor of a battle. Inevitably, the discussion turns away from the strengths of airpower versus land power to the strategic objectives of the war and how an integration of all arms is necessary for success. Both sides agree, however, that the commitment of ground troops is the epitome of a political statement of involvement. This fact has not changed throughout history and there is no cogent rationale for it to do so in the future. No country likes to put the lives of its sons and daughters in harm's way without a "good" reason. Nonetheless, with its quick response capability, an infantry force is a viable and likely first response to any situation that requires a military response. The recent experience of the nation's strategic asset--the 82nd Airborne Division--being the first unit in the Persian Gulf War exemplifies this actuality. The mobility of infantry combined with its firepower, both lethal and less-than-lethal, is critical to this political action of quickly committing forces to an operation, but the more encumbered an infantryman with technology, the less mobile he becomes.

Chapter Four

CURRENT INNOVATION EFFORTS

"We Can have the best technology, the best equipment; but ultimately it takes men and women of courage willing to fight and die for their comrades and their country. That's what delivers victory."

General Gordon R. Sullivan, U.S. Army (ret.), former Chief of Staff, U.S. Army

Both services that possess the infantry arm have various ongoing innovation efforts. Previously mentioned was the Army's umbrella concept to "reconceptualize and redesign" its force at all echelons, Force XXI. The Marine Corps' umbrella innovation effort is entitled "Sea Dragon," and it is shepherded by the newly formed Commandant's Warfighting Lab. These efforts have differing goals based on the many factors such as the interpretation of each service's currently assigned mission, perception of future missions,

and level of technology acceptance. These factors, in addition to several others that are unimportant to this discussion, affect how the services program their research and development (R&D) funds for future systems. As a matter of fact, the services do not receive an equal apportionment of R&D dollars as compared to their endstrength or other "fairshare" qualifier. As a result of this disparity in resources, the Marine Corps must rely on the Army to investigate many "risky" new technologies with only minimal USMC monetary contribution. However, even given the "warts" of this system, it has produced several highly effective results, such as the M- 16 rifle, Dragon Antitank Weapon and the Medium Tactical Vehicle Replacement Program.

This analysis of both services' current efforts is divided into two sections, overall umbrella innovation concepts and technology-specific, infantry-focused programs for each service. In some cases, Marine Enhancement Program (MEP) for example, the technology programs are not directly related to the service's umbrella innovation concept. The MEP program commenced prior to the Sea Dragon effort, and is only remotely associated. Nevertheless, it is a significant and productive infantry-focused innovation effort of the Marine Corps. Through evaluating these concepts and programs, the two services different levels of fascination and commitment to the "system of systems" idea and other RMA-induced approaches, the application of information technology concepts becomes readily apparent. Without surprise, both services clearly have diverse views on how it perceives the impact of technology on the battlefield and specifically on the infantryman.

Umbrella Military Innovation Concepts

U.S. Army: Force XXI

Force XXI, as articulated by the service leaders, is the U.S. Army's effort to transform in its entirety to a more flexible and adaptable information-based army. The U.S. Army bureaucracy imagines an Army-wide exploitation of information and digital technologies that will increase the performance of the force by an order of magnitude.²⁸ Through integrating these technologies, the Army foresees the capability to connect all levels of soldiering from the individual soldier to the senior commander. The hope is that

by integrating and connecting the complete hierarchy, data transmissions and communications will be enhanced to allow a near "perfect" picture of the battlefield to be shared amongst all. For the individual infantryman, this picture would be displayed on a state-of-the-art helmet mounted display that can be viewed while conducting operations in any environment. Meanwhile other soldiers would be able to see the same data in their tanks, APCs, helicopters or on tactical displays in command centers. The implied enhancement lies in providing unprecedented situational awareness and effectively improving the precision and speed of voice and data communications. The Army proclaims that the heightened situational awareness will result in significantly improved lethality, survivability, tempo, versatility, sustainability and deployability.²⁹ Whether this is true remains to be seen. Improving situational awareness will certainly provide benefits, but this is not an instant panacea for eliminating battlefield friction.

This environment for innovation, intent on improving the future Army, allows for the inclusion of ideas from all facets of war or OOTW. Force XXI is defined as "a concept for a learning organization."³⁰ With this underlying theme, the governing precept is to consider philosophical, theoretical, materiel and organizational changes from how the Army thinks about war, to how it fights and leads on future battlefields, and succeeds in OOTW.³¹ This openness provides an opportunity for infantry-focused concepts to be considered and included, if deemed necessary. However, as briefly addressed in the last chapter, the infantry-focused R&D program that the army is championing, 21 CLW, does not adequately address the probable future employment of infantry forces.

Force XXI: Too Technology Dependent?

Force XXI provides an excellent backdrop for "thinking" about a future Army--doctrinally, organizationally and technologically. Unfortunately, in reading the prolific writings of the service's leaders, the U.S. Army appears to have swallowed "hook, line and sinker" the promises of proponents of the RMA, and the concepts of the Toffiers. This disregards many of the lessons in the aftermath of Desert Storm. A sobering statement by a retired Indian Army Chief of Staff in the wake of the Gulf War--"don't fight the American's without nuclear weapons"--may tell America much about its future adversaries.³² The high-technology conventional warfare style that America displayed in that war will most likely lead others to

seek out methods to combat our obvious technological advantages. This can be either a low-technology counter or weapons of mass destruction, which the Indian Chief of Staff recommends. Whatever the response, America cannot afford to sell its soul to the technology god. This appears to be the direction of the U.S. Army.

The literature declares that the Force XXI strategic objective is to:

"transform the force from an industrial age Army to a knowledge- and capabilities-based, power projection Army capable of land force dominance across the continuum of 21st Century military operations, by leveraging information technology to advantage the Army's quality people, and by redesigning the fighting forces and the Army's sustaining base to better support these forces."³³

The key component to this strategy is the reliance on information and information technology, which are directly tied to the present RMA and the positive results of the Gulf War. By molding the future Army to this stated goal, it neglects the lessons learned from the Gulf War and prepares for a war that the Army **wants** to fight in the future, not the conflicts it will probably encounter. This is an important distinction. One that the Army must address as it "redesigns" itself. The Army must take a step back from the euphoria of Desert Storm and consider the lessons provided by the unfortunate experiences of the Rangers in Somalia and other recent American debacles. Force XXI has much to offer but the leaders must hold fast to the stated words in their centerpiece Force XXI document, TRADOC pamphlet 525-5 *Force XXI Operations*:

Technology offers much, but American soldiers of the future, as in the past, will be called upon to be flexible and versatile. They will be counted upon to display mental agility and American ingenuity as they seek alternative methods, often low-technology, to cope with the circumstances that surround them. For example, jamming communication may require beating oil drums to interfere with jungle telegraphs--a primitive but effective means of communicating during recent operations involving a third-world adversary.³⁴

The Army can not afford to design a future force that possesses limited flexibility and seeks only technological solutions for its problems. As any practitioner of the military art knows--Clausewitzian friction lives!

"Sea Dragon" is an initiative with the expressed mission to encompass the Marine Corps' "commitment to innovation." On 1 October 1995 by the Commandant's Warfighting Lab (CWL), one of General C.C. Krulak's highest priority efforts since assuming the position of Commandant, ushered in Sea Dragon. As stated by General Krulak, Sea Dragon

"is not a predetermined force structure and predetermined operational technique, but a method of evaluating potential structures and techniques. It is a model for future thinking and an umbrella under which ideas are born, tested, bear fruit, or die. Perhaps best described as a "quest" for solutions to the problems of tomorrow, it is an overarching approach to developing a whole host of new tactical and operational techniques and thinking involving both Marine and navy forces."³⁵

Like Force XXI, Sea Dragon is an innovation effort that seeks to prepare the force for the 21st century. However, the Marine Corps' focus is more people-centered. The goal is to "equip high quality Marines, not man the equipment." This oft quoted phrase represents the basic difference between the two services' concepts. The difference lies in the focus; the Marine Corps is extremely interested in the technologies that the RMA has to offer, but it realizes that the sole focus can not be on developing a high-technology force for the future. This realization is not directly attributed to any divine wisdom or premonition regarding the future employment of tomorrow's Marine Corps; it is attributed to the realization that the Marine Corps will continue to exist as a pauper service with specific functions.

As chapter two discussed, the current climate, and most probably the next decade's as well, will be one of downsizing military forces and dwindling budgets. With this said, it is highly improbable that the Marine Corps' share of DoD's fiscal budget will increase. Only changes on the margins are likely and these relatively minor amounts will not allow the Marine Corps to transform itself into a high-technology futuristic force. The Marine Corps must strive to maintain applicability to likely future missions.

With the relative youth of the Sea Dragon concept, pens are presently being put to paper to articulate the direction of this effort. The CWL and the Marine Corps University will surely be a critical component of the future studies under this umbrella concept and, just as in the interwar period, the Marine Corps' leaders must foster an innovative

environment. A cursory look at recent innovation events will provide a more complete understanding of the Sea Dragon effort.

Experimental Unit/Universal Spot Team/Assault Battalion

The Sea Dragon concept is only in the beginning stages of implementation and the proponents must remain open to new ideas--it cannot pursue just one solution for a perceived alternative future. When the Marine Corps adopted Sea Dragon as its overarching rubric for innovation, it was closely associated with a concept referred to as the Universal Spot Team/Assault Battalion Concept. This concept is still synonymous with the Sea Dragon moniker in many circles. This paper does not intend to cast any judgment on the concept but to suggest that the Marine Corps must investigate as many alternative futures as possible. Recent Marine Corps innovation experiences are germane to this discussion.

In 1994 then-Lieutenant General C.C. Krulak, Commanding General of the Marine Corps Combat Development Command, established the Experimental Unit at Quantico, VA, under his tutelage. When he was promoted to Commandant, General Krulak, folded this Unit into the Commandant's Warfighting Lab. Its purpose was to conduct a series of field exercises to evaluate technologies and to "test" evolving tactics and new potential doctrines. Its stated goal was to examine from the tactical level how the infantryman can use technology, develop requirements for their introduction and improvements, as well as identify needs for potentially new technologies. In addition, the Unit was established to investigate new concepts for tactical employment. A test unit is a key component for success in innovation and the Marine Corps should ensure that this effort continues.

During this period, the Marine Corps initiated a joint undertaking with the Center for Naval Analyses (CNA) to further develop the concept of Operational Maneuver from the Sea (OMIFTS). Early in 1994, a seminar was conducted to wargame tactics and capabilities required for implementing the principles of OMIFTS. One proposed idea was the "assault battalion" concept. This battalion was postulated to be a model for future light infantry battalions. This assault battalion would be organized, equipped and trained to fight either as a battalion-sized maneuver unit or as a multitude of small "universal

spot teams." These teams would be capable of reconnaissance of enemy positions and bringing in precision fires to destroy targets.³⁶ The Marine Corps established a Special Purpose Marine Air Ground Task Force (SPMAGTF) to experiment with and evaluate this concept beginning in summer 1996.~~ The initial evaluation of the concept conducted by the Center for Naval Analyses (CNA) found several weaknesses that need to be properly addressed during future experiments. Specifically, the relevant findings from the CNA evaluation are as follows:

1.) As a result of the smaller assault battalion's structure, when compared to that of the current infantry battalion, the assault battalion wields substantially less combat power. An assault battalion fighting as a traditional battalion would thus probably require considerable fire support.

2.) The assault battalion would be less capable of absorbing casualties than the current infantry battalion.

3.) The belief that future precision fire support will be available in sufficient quantities is the central component to the success of the concept. The Marine Corps needs to assess the probability that applicable weapon systems are appropriately planned for the future.³⁸ Obviously, there are additional concerns that need to be addressed prior to an implementation of the assault battalion concept such as infiltration tactics or insertion methods, sustainability, command and control, and fire control methods and measures. This universal spot team, the name given to this small unit with extensive controlling fires capability, concept is certainly a concept that may have applicability, as the nature of the battlefield changes and technologies become available to support it. However, the Marine Corps must address the CNA issues of reduction in combat power and the assault battalion's inability to absorb casualties. Other issues require resolution as well, such as sustainability and insertion method, but they are beyond the scope of this paper. Also, with the increased tasking to perform manpower intensive OOTW missions, these assault battalions may not be able to answer the call without draining the entire ground combat forces of the Marine Corps.

These Marine Corps' experiences exemplify that the future innovation environment is not without growing pains. As services attempt to create an environment conducive for innovation, many forces will

attempt to shape the future in a certain direction without adequate study. These forces may come in the form of senior service leaders' "pet projects," retired flag officers working as Defense contractors' "visions," and so on. Not to say some of these ideas do not possess merit; to the contrary, these ideas may be extremely insightful and creative, they just deserve equal scrutiny as all others.

Infantry-Focused Technology Programs

U.S. Army: 21st Century Land Warrior (21 CLW)

21 CLW is an Army-led program focused on modernizing basic infantry equipment, and through technology, enhancing the performance of the individual infantryman. The Army's general concept is to revamp the individual soldier and turn him into a "forward sensor of the digitized battlefield."³⁹ The Army approach is a modularized system that integrates emerging commercial information and microprocessor technologies with a vision of a future dismounted infantryman. The program is an R&D "demonstration" effort that does not intend to field systems but to generate prototypes that will be subject to further testing and evaluation. Its articulated goal is to effectively modernize and enhance the soldier's lethality, sustainability, command and control, survivability and mobility in preparation for the 21st century digitized battlefield.⁴⁰ BG Henry T. Glisson, commander of the U.S. Army Soldier System Command, the command tasked with championing this effort, states his organization's mission "is to expediently improve the soldier's ability to quickly win the current battle, survive and fight again, if necessary, to win the war."⁴¹

The major sub-program of 21 CLW is the Generation II Soldier (GEN II) Advanced Technology Demonstration. This program extends a 1992 demonstration effort that initiated soldier-oriented R&D, entitled the Soldier Integrated Protective Ensemble (SIPE). SIPE provided significant improvement in individual and collective night, obscurance and chemical environment performance. GEN II's focus is to integrate various components into an affordable, integrated, modular fighting system that will perform beyond the SLPE capabilities at a weight and bulk that is acceptable.⁴² The GEN II system is broken down into five major subsystems (Integrated Headgear, Weapons Interface, Individual Computer Radio, Uniform Protective and Microclimate Cooling/Power--see Appendix A) to allow the engineers from

various branches to work together and produce an integrated solution vice a conglomeration of items "hung on the soldier like a Christmas tree."

This novel R&D effort has enjoyed a strong following amongst those infantryman who have never witnessed major advances in their lifetimes in the infantry environment. However, the Commanding General of the Infantry School that is conducting testing exercises has stated that the basic infantry mission will not change. Infantry of the future will still have "to close with the enemy by means of fire and maneuver to destroy or capture him, or to repel his assault by fire, close combat, and counterattack." He envisions that technology will empower the infantry to conduct their basic mission better, not change it.⁴³

Many flaws quickly surface as one peels back the proverbial onion. First, 21 CLW treats the infantryman as a human sensor on the future battlefield, which essentially reduces the magnificent advantage of the human soldier on the battlefield--a creative, rapidly adaptable and innovative mind. 21 CLW downplays the importance of this facet of the soldier by treating him as simply a critical input device designed to improve overall situational awareness throughout the battlefield.⁴⁴

The next concern regards the relevance of these technologies to OOTW operations. As previously mentioned, OOTW is extremely manpower intensive. A clear but unstated goal is to improve the individual and collective performance of the infantry. By doing so, the current structure would be reduced and today's infantry units reorganized in expectation of performing as well or better at today's missions. These new organizations may perform conventional warfare functions extremely well but their inherent flexibility to feed the masses, fight fires and control crowds will most likely be substantially degraded, as force structures diminish.

The final concern revolves around the applicability of this type of electronic gadgetry to the infantry environment. Scientists and developers must remember that the world of the infantryman is not sterile and immaculate, but an environment that is grimy, frigid and wet or unbearably hot and dry; in short, not a favorable environment for sophisticated, high-technology silicon chips.

U.S. Marine Corps: Marine Enhancement Program (MEP)

MEP is a Marine Corps program that is attempting to introduce incremental improvements in the

infantryman's lethality, communications ability and survivability. MEP is focused on inexpensive, high-volume and low-technological solutions that improve the comfort, endurance and combat performance of the infantryman. The MEP executors solicit recommendations from operational units annually and then prioritize the efforts through the Marine Corps' Combat Development process. Examples of the items that the MEP is pursuing for fiscal year 1996 are:

- 1.) Infantry Combat Boot
- 2.) Improved Medium Pack and Assault Pack
- 3.) Sleeping Bag Bivvy Sack
- 4.) M9 Bayonet
- 5.) Medium Machine gun Tripod
- 6.) Combat Shotgun
- 7.) Battlesight Zero/Dry Firing System⁴⁵

These low-technology solutions are essential to improving the morale and effectiveness of the infantry arm. Certainly, this program is not intended to revolutionize the way the infantry is employed; just to provide evolutionary enhancements that will enable the Marine infantryman to perform better.

MEP exhibits the Marine Corps' commitment to the infantry arm without an over-fascination with technology. By focusing on the basic needs of the infantry, e.g., lightening the load, the infantryman's performance is ultimately enhanced. This program is obviously not the "end all" solution but it is an effective means of providing innovation through evolutionary improvement.

Chapter Five

CONCLUSION

"It is a fallacy that infantry is the most easily trained arm. None needs more thought, more skill, if it is adequately to play its part. The reason why it is difficult to train is because it is less concerned with material elements than other arms. The infantry soldier's use of his weapon is but complementary to the use he makes of tactics and ground in the approach to his objective and his opponent. To train infantry, which is essentially the tactical arm, is to exercise an art whereas to train the technical arms is to apply a science. The infantry soldier is less of a technician, but he is a field-craftsman--this is the title of honour to which he may aspire in the profession of arms.

Sir Basil Liddell Hart

While future infantry may undoubtedly look different, many of their characteristics and functions must remain unchanged. The following points are representative of these key characteristics and no matter what is created out of the services' innovation efforts, future infantryman must possess these capabilities. The anticipated employment of future forces must guide the U.S. military's R&D community. It is clearly

necessary to postulate what future war will look like in twenty-five years, but this cannot be done at the expense of preparing for the next decade. Tomorrow's infantry must be prepared to answer the expected call.

1.) Infantry in a conventional war scenario must remain flexible and versatile enough to operate in all environmental conditions, whether urban, jungle, mountains, desert or even the horrid nuclear, chemical or biological environment in which the force may have to operate in one day. It is critical that infantry remains capable to perform the gamut of conventional infantry missions in the most stringent of environments. General-purpose infantry forces are an essential component in any low-intensity or high-intensity conflict.

2.) Infantry forces will continue to play a major role in manpower-intensive OOTW operations. Infantry will perform tasks from the mundane, such as manning security points, to the exhilarating, such as keeping the peace amongst local factions or providing disaster relief.

The Marine Corps' 1940 *Small Wars Manual*, an official publication that addressed the political and tactical challenges of low and mid-intensity conflicts,⁴⁷ may need dusting off once again. Many current writers suggest that future conflicts will be at the lower end of the spectrum. The Marine Corps' produced *Mid Range Threat Estimate*, a well-respected document that evaluates and predicts potential threats over the next decade, states that the vast majority of future conflicts will be low-intensity or less. The Marine Corps must focus its expeditionary capability to meet this threat and the infantry arm is a vital component.

3.) War termination is typically completed by occupying disputed territory--the possessor will negotiate the resolution on his terms. Infantry will remain a vital component for this task. Air forces can conduct deep shaping operations aimed at providing favorable conditions for decisive actions and a conclusion to the battle, but history demonstrates that it is up to the ground forces to ultimately control and occupy the territory after the decisive battles are fought. Desert Storm is an obvious example in which the coalition

forces, led by the U.S., recaptured Kuwait and negotiated a favorable conclusion on their terms. This only occurred after approximately 38 days of intensive air operations focused on creating favorable conditions for a ground assault, which was successful in 100 hours. The occupation of ground--specifically Kuwait--was the critical element of terminating this crisis. This simplistic example displays a relevant characteristic required for future infantry forces in many scenarios.

Not only is infantry essential to the termination of hostilities, it also represents strategic commitment to an operation or peacekeeping adventure, whenever it is committed to a region. This does not have to always be an infantry force, as exemplified by the assignment of an armored division to the Bosnia mission. However, infantry is usually a vital component to these forces, as a result of their inherent general-purpose capability and flexibility.

Infantry innovation cannot focus solely on the glamour of technology, it must be centered around the human element. Weapon systems should support people; not the robot-like concept of people becoming weapons systems or sensor platforms. The Marine Corps should be patient and steady in its efforts to innovate. With its diminutive budget and its probable future roles and missions, it is unwise for the Marine Corps to pursue the glitz of the high-tech cyber-warrior. The 21 CLW program does justify Marine attention and minor participation, since certain products of this effort will enhance Marine infantry capability in specific situations. The Marine Corps currently contributes approximately fifteen percent of the overall 21 CLW budget, with the majority goes to the Forward Observer/Forward Air Controller (FO/FAC) program. This "sub"-program is a Marine initiative to use technology to reduce the response time of "rounds on target." By creating a lightweight, man-portable, target identification, acquisition and data relay system, which can provide all the necessary functions of an FO or FAC, response times can be cut in half.⁴⁸ By shaping the 21 CLW tools of its choice, the Marine Corps can reap benefits well beyond its meager contribution by leveraging the Army's R&D contribution.

If the human element is disregarded by the developers of future infantry "systems," the resulting high-tech "cyber-soldiers," may not be able to accomplish OOTW or other "lower-end" missions. As

discussed in chapter four, the loss of flexibility and over-reliance on high-technology may render them relatively useless in future OOTW or low intensity conflicts.

As a final concern on the development of a force of high-tech "cyber-soldiers," this force will be expensive to buy, train and sustain, and the trade offs are not acceptable for the Marine Corps...even if it could afford it. The Marine Corps must retain the appropriate manpower and avoid "trading" force structure for this capability. Once again, Marine Corps missions in the next decade will most likely be extremely manpower-intensive OOTW missions.

But the bottom line is that Admiral Owens' "system of systems" may be applicable to the high-tech battlefield of PGMs, Aegis Cruisers, JAST fighters and future armored vehicles but not to the infantryman's grimy and disorderly environment. The Marine Corps must continue to innovate, ensuring it does not fall prey to the technology god and sacrifice its human component. . . the Marine rifleman.

APPENDIX A: 21ST CENTURY LAND WARRIOR (21 CLW) SUBSYSTEMS

Integrated Headgear Subsystem (IHS)

The LHS is designed to use the ballistic protective helmet shell as a means to access a sophisticated electronic system for communications, hearing augmentation, integrated night vision mobility sensor, and a high resolution display for sensor and computer output. The night vision mobility sensor has capabilities that will enhance situational awareness by allowing the soldier to identify the direction of sounds and the thermal imagery device can be programmed to look for spots in the field of vision that do not move at the same rate of speed as all the others. This movement sensor can alert a sentry to moving object that may pose a threat.⁴⁹

Weapons Interface Subsystem (WIS)

The WIS is a future system that will integrate with the Objective Individual Combat Weapon (OICW) that is envisioned to replace the M16A2 rifle, the M203 grenade launcher, and selected M249

machine guns, as well as future weapon systems. The WIS will allow the soldier to view the weapon reticle on the headgear display. This capability will provide improved protection by allowing the individual soldier to shoot around a corner while the shooter remains under cover. The OICW is envisioned to provide fire control that can identify and acquire a target and provide feedback to indicate the type of munition to use-- kinetic energy projectile or a fragmenting air-burst.⁵⁰

Individual Soldier's Computer/Radio (ISC/R)

The ISC/R is the brain behind the integrated GEN II system. As commercial technology improves, the ISC/R will continue to be enhanced. This system will provide the capability to store, process, retrieve, and display information in order to provide input for the soldier and his other subsystems. It will interface with a variety of sensors, such as chemical agent detectors, personal status monitors, thermal sensors, range finders, combat identification interrogators and receivers, and navigational aids such as the Global Positioning System (GP S). In addition, the ISC/R will process and display digitized maps and overlays, and allow the individual soldier to transmit updates to others. The ISC/R also doubles as a radio that can transmit and receive voice and data, such as thermal and video imagery. This system will link to the other digitized command and control nodes and allow near real-time data to be transmitted and received directly to an individual soldier.

Uniform Protective Subsystem (PS)

The PS consists of an integrated system of for body armor, load bearing equipment and a uniform component. One of the goals of this subsystem is to reduce the weight of existing systems by twenty percent without any reduction in protection, in a modular package.⁵¹ A major concern is to ensure that the components of the other subsystems are adequately placed in relation to the form and function of the overall soldier subsystem. The PS is key to the integration of the 21 CLW effort since it will provide multi-threat ballistic protection for the torso and limbs, multi-spectral signature reduction, enhanced chemical/biological protection and advanced load carriage..

Microclimate Cooling/Power Subsystem (MCC)

The MCC is envisioned to deliver extensive cooling under hot conditions such as NBC Mission Oriented Protective Posture (MOPP) conditions, thus allowing soldiers to perform with no reduction in capability. This subsystem is to weigh less than ten pounds.

¹ Michael J. Mazarr, *The Revolution in Military Affairs: A Framework for Defense Planning* (Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, 1994)

2-4. and James R. FitzSimonds and Jan M. Van Tol, "Revolution in Military Affairs,"

Joint Forces Quarterly (Spring 1994)25-26.

² The phrase "Revolution in Military Affairs" will be used instead of Military Technical Revolution throughout this paper. It is generally accepted that RMA is a more encompassing phrase that captures the idea that technology is a contributor, but not necessarily the major contributor to a revolutionary transformation of warfare.

³ Mazarr, 2.

⁴ Mazarr, 2.

⁵ Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century*, (Boston: Little-Brown, 1993). The Tofflers believe that we are entering a third "wave" of warfare, information warfare with the first two being agrarian warfare and industrial warfare. The transformation from the age of industrial warfare to the age of information warfare is the premise of their book.

⁶ Jason Glashow and Frank Oliveri, "Weaponry, Training Drive Smaller U.S. Force," *Defense News*, (Nov 20-26, 1995) 16-17.

⁷ National Security Act of 1947, P.L. 80-253 (61 Stat. 495), as amended through September 30, 1973 (GPO, 1973), 16-17.

⁸ Glashow and Oliveri, 16.

⁹ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell UP, 1991) 2 1-22.

¹⁰ William A. Owens, "System-Of-Systems," *Armed Forces Journal*, (January 1996) 47.

¹¹ Quoted in the Army pamphlet "*Force XXI... America's Army of the 21st Century*," (Office of the Chief of Staff Army, Director, Louisiana Maneuvers Task Force, 15 January 1995) 8.

¹² For further amplification, see Samuel P. Huntington, "The Clash of Civilizations?" *Foreign Affairs*, (Summer 1993) 22-49. and Robert P. Kaplan, "The Coming Anarchy," *The Atlantic Monthly*, (February 1994) 44-76.

¹³ Martin van Creveld, *The Transformation of War* (New York: Free Press, 1991).

¹⁴ Kaplan, "The Coming Anarchy" 72.

¹⁵ Rosen, 96.

¹⁶ Williamson Murray and Barry Watts, *Military Innovation in Peacetime*, (Unpublished). This well-written essay describes the development of interwar period innovations and draws parallels with the current environment.

¹⁷ Quoted in Jeter Isely and Philip Crowl, *The US. Marines and Amphibious War: Its Theory and Practice in the Pacific* (Princeton: Princeton University Press, 1951) 6.

¹⁸ Allen Millet, *Semper Fidelis: The History of the United States Marine Corps*, (New York: Macmillan Publishing, 1980) 329.

¹⁹ Memo to the President, January 13, 1941, File 18-E, Office Files, Roosevelt Papers. Quoted in Millet, *Semper Fidelis*, 325.

²⁰ Rosen, 64-67. Accurate secondary sources are abundant that address the evolution of amphibious warfare. Rosen's *Winning the Next War: Innovation and the Modern Military* was used since its context is germane to this paper.

²¹ Rosen, 82-85.

²² For information about the establishment of the Commandant's Warfighting Lab (CWL) see "The Commandant's Warfighting Lab," *Marine Corps Gazette*, (September 1995) 9, Kenneth R. Bergman, "A Ticket to Ride the Dragon" and Randolph A. Gangle, "Sea Dragon Update," *Marine Corps Gazette*, (February 1996) 12-13.

²³ Seymour Deitchman, *Limited War and American Defense Policy* (Cambridge: M.I.T. Press, 1964) 15-18. This figure obviously requires updating and as counting of Low-Intensity Conflicts (LIC) involves the defining of a series of qualifications to be included in the tabulations, this essay will not deal with this dilemma. However a recent Scientific American article quotes the figure as "100 or so wars fought since World War II." See Stix, Gary. "Fighting Future Wars." *Scientific American* December 1995: 92-98.

²⁴ John A. English, *A Perspective on Infantry*, (New York: Praeger Publishers, 1981) 240.

²⁵ Joint Publication 3-0, *Doctrine for Joint Operations*, (1 February 1995) I-2-I-3.

²⁶ Henry T. Glisson, "Army's Newest Command Focuses on Soldier as a System." *Army RD&A Bulletin* (May-June 1995) 18. Brigadier General Glisson, US Army, is the Commanding General of the U.S. Army Soldier Systems Command headquartered at Natick, MA. Its mission is "to develop, integrate, acquire, and sustain soldier and related support systems. To modernize, balance, and improve the soldier's warfighting capabilities, performance, and quality of life, and to perform similar functions for other services and customers.

²⁷ "Force XXI... America's Army of the 21st Century," (Fort Monroe: Office of the Chief of Staff; Army, Director, Louisiana Maneuvers Task Force, 15 January 1995) 31.

²⁸ TRADOC Pamphlet 525-5, *Force XXI Operations*, (Fort Monroe: Army Training and Doctrine Command, August 1994). This is the foundation document for the Army's Force XXI effort. It develops these concepts in much greater granularity.

²⁹ "Force XXI... America's Army of the 21st Century," 6.

³⁰ TRADOC Pamphlet 525-5, 4-10.

³¹ TRADOC Pamphlet 525-5, 4-10.

³² Patrick J. Garrity, *Why the Gulf War Still Matters: Foreign Perspectives on the War and the Future of International Security* (Los Alamos National Laboratory: Center for National Security Studies, July 1993) xiv.

³³ "Force XXI... America's Army of the 21st Century," 22.

³⁴ TRADOC Pamphlet 525-5, 3-21.

³⁵ Charles C. Krulak, "Embracing Innovation," *Marine Corps Gazette*, (January 1996) 19.

³⁶ H. Dwight Lyons, Jr., *Project Culebra: Analysis of the Assault Battalion Concept*, (Alexandria: Center for Naval Analyses, 1995) 1.

³⁷ Gangle, 13.

³⁸ Lyons, 2.

³⁹ John G. Roos, "The 21st Century Land Warrior." *Armed Forces Journal*, February 1995, 1. This comment about the future soldier system being an advanced battlefield sensor was made by Mr. George Singley, the Army's Assistant Deputy Secretary for Research and Technology.

⁴⁰ Henry T. Glisson, "Army's Newest Command Focuses on Soldier as a System." *Army RD&A Bulletin* (May-June 1995) 19.

⁴¹ Glisson, 20.

⁴² Gregory J. Dyekman, "The 21st Century Land Warrior." *Infantry* (July-August 1994) 13.

⁴³ Jay Hendrix, *Warrior Focus: The Emerging Light Infantry*, (U.S. Army Internet Homepage) 6.

⁴⁴ Roos, 1.

⁴⁵ Charles E. Wilhelm, "View from the Foxhole," *Marine Corps Gazette* (August 1995)

⁴⁶ B. H. Liddell Hart, *The Future of Infantry*, (London: Faber and Faber, 1933) 64.

⁴⁷ Millet, 262-263.

⁴⁸ Roos, 4. and H.T. Hayden, "21st Century Land Warriors for Tomorrow's Battlefield," *Amphibious Warfare Review* (Summer/Fall 1995) 40-41.

⁴⁹ Gawne, Jon, "The 21st Century Land Warrior," *Raids* (January 1995) 11.

⁵⁰ Dykeman, 13.

⁵¹ Scott R Gourley, "U.S. Army Warriors: 21st Century Equipment for 21st Century Missions," *Defense Electronics* (January 1995).

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